

Date: Tuesday, 31/03/2009 1:04:35 PM  
 User: Julie Dawson

# Process Sheet

**Customer** : CU-DAR001 Dart Helicopters Services  
**Job Number** : 46741  
**Estimate Number** : 10390  
**P.O. Number** :  
**This Issue** : 31/03/2009 **S.O. No.** :  
**Prsht Rev.** : NC  
**First Issue** : / / **Type** : MACHINED PARTS  
**Previous Run** : 37885  
**Written By** :  
**Checked & Approved By** : 09-03-31-54  
**Comment** : Est Rev: A New Issue 05-11-08 JLM  
 Est Rev: B As per Rev B 06-03-10 JLM

**Drawing Name** : BAR  
**Part Number** : D3197041  
**Drawing Number** : D3197 REV B  
**Project Number** : N/A  
**Drawing Revision** : B  
**Material** :  
**Due Date** : 07/04/2009 **Qty:** 6 **Um:** Each

## Additional Product

Job Number:



**Seq. #:** **Machine Or Operation:** **Description :**

1.0 M7075T73R1000 7075-T73 Rd Bar 1.00



**Comment:** Qty.: 2.5410 f(s)/Unit Total: 15.2460 f(s)  
 Material: 7075-T73 (QQ-A-200/11) or (QQ-A-225/9) 1" OD  
 (M7075T73R1.000)  
 Identify for D3197-1 <sup>48</sup>  
 Batch: M111845 <sup>M111485</sup>  
 14.625"

09-04-28

2.0 BAND SAW BAND SAW



**Comment:** BAND SAW  
 Cut blanks: 29.125" long

09-04-28 (6)

3.0 HAAS1 HAAS CNC VERTICAL MACHINING #1



**Comment:** HAAS CNC VERTICAL MACHINING #1  
 1-Face ends to lenght per dwg D3197  
 2-Machine D3197-1 as per Folio FA340 and Dwg D3197  
 3-Deburr

09/04/28 (6)

PTO ->

4.0 QC2 INSPECT PARTS AS THEY COME OFF MACHINE



**Comment:** INSPECT PARTS AS THEY COME OFF MACHINE

09/04/28 (6)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D3197-041 PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes ☒ No ☐ DQA: PD Date: 07/05/05

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR: <u>46741</u>		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
09/04/29	3.0	Width of Flate .400 instead of .300 RC OFFSET Error / operator error	CP 09.04.29 per QSI 042	OK per attached SR.	CP 09/04/29	S 09/04/29	CP 09.04.29 per QSI 042	S 09/04/29

NOTE: Date & initial all entries

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: BAR

Job Number: 46741

Part Number: D3197041

Job Number:



Seq. #:	Machine Or Operation:	Description :
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5.0	LATHE CONV.	CONVENTIONAL LATHE
-----	-------------	--------------------



Comment: CONVENTIONAL LATHE  
Chamfer as per Dwg D3197

09-04-27 (6)

6.0	QC8	SECOND CHECK
-----	-----	--------------



Comment: SECOND CHECK

SP 01/04/27 (6)

7.0	HAND FINISHING1	HAND FINISHING RESOURCE #1
-----	-----------------	----------------------------



Comment: HAND FINISHING RESOURCE #1  
Chemical Conversion Coat as per QSI 005 4.1

BL 09-04-30

(6)

8.0	POWDER COATING	POWDER COATING
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Comment: POWDER COATING  
Powder Coat Grey Sandtex (Ref: 4.3.5.6) as per QSI 005 4.3

START TIME: 13:25  
OVEN TEMPERATURE: 300°  
FINISH TIME: 13:55

UMD/Fd.

09/04/30

(X6)

9.0	QC3	INSPECT POWDER COAT/CHEMICAL CONVERSION
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Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

09-05-01

(6)

10.0	D26905	Lanyard Assembly
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Comment: Qty.: 2.0000 Each(s)/Unit Total : 12.0000 Each(s)  
Pick:  
Qty Part Number Description Batch  
2 D2690-5 Lanyard B37927

09/5/01 (6)

11.0	D32421	Tag
------	--------	-----



Comment: Qty.: 2.0000 Each(s)/Unit Total : 12.0000 Each(s)  
Pick:  
Qty Part Number Description Batch  
2 D3242-1 TAG B37934

09/5/01 (6)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: BAR

Job Number: 46741

Part Number: D3197041

Job Number:



Seq. #:

Machine Or Operation:

Description :

12.0

AN960JD10

Washer



Comment: Qty.: 6.0000 Each(s)/Unit Total : 36.0000 Each(s)

Pick:

Qty Part Number

Description Batch

6 AN960JD10

Washer

*M110885*

*LC*

13.0

D34893200

PIP PIN



Comment: Qty.: 2.0000 Each(s)/Unit Total : 12.0000 Each(s)

Pick:

Qty Part Number

Description Batch

2 D3489-3-200

Pip Pin

*39106 7X B46991 5X*

*LC*

14.0

MS21042L3

Nut



Comment: Qty.: 2.0000 Each(s)/Unit Total : 12.0000 Each(s)

Pick:

Qty Part Number

Description Batch

2 MS21042L3

Nut (or -3)

*M110844*

*LC*

15.0

MS27039124

Screw



Comment: Qty.: 2.0000 Each(s)/Unit Total : 12.0000 Each(s)

Pick:

Qty Part Number

Description Batch

2 MS27039-1-24 Screw

*100151*

*LC 9/3/01 (6)*

16.0

SMALL FAB 1

SMALL & MEDIUM FAB RESOURCE 1



Comment: SMALL & MEDIUM FAB RESOURCE 1  
Assemble D3197-041 as per Dwg D3197

*09/05/04 (6)*

17.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

*09/05/04 (6)*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: BAR

Job Number: 46741

Part Number: D3197041

Job Number:



Seq. #:

Machine Or Operation:

Description :

18.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and Stock

Location: ST260

SS 09/05/05 x6

19.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

09/05/05

Job Completion



MF  
09-05-05

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



DART AEROSPACE LTD		Work Order: 46741
Description: Bar		Part Number: D3197-1
Inspection Dwg: D3197	Rev: B	Page 1 of 1

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
29.00	+/-0.030	29.00	✓			
25.06	+/-0.030	25.06	✓			
11.44	+/-0.030	11.44	✓			
0.500	+/-0.010	.501	✓			
0.250	+/-0.030	.251	✓			
Ø0.219	+0.005/-0.000	.2195	✓			
Ø0.191	+0.005/-0.000	.194	✓			
1.000	+/-0.005	1.000	✓			
2.69	+/-0.030	2.686	✓			
1.000	+/-0.010	1.001	✓			
0.300	+/-0.010	.300	✓			
0.063 x 45°	+/-0.010	.063 x 45	✓			
Ø1.000	+/-0.010	1.000	✓			

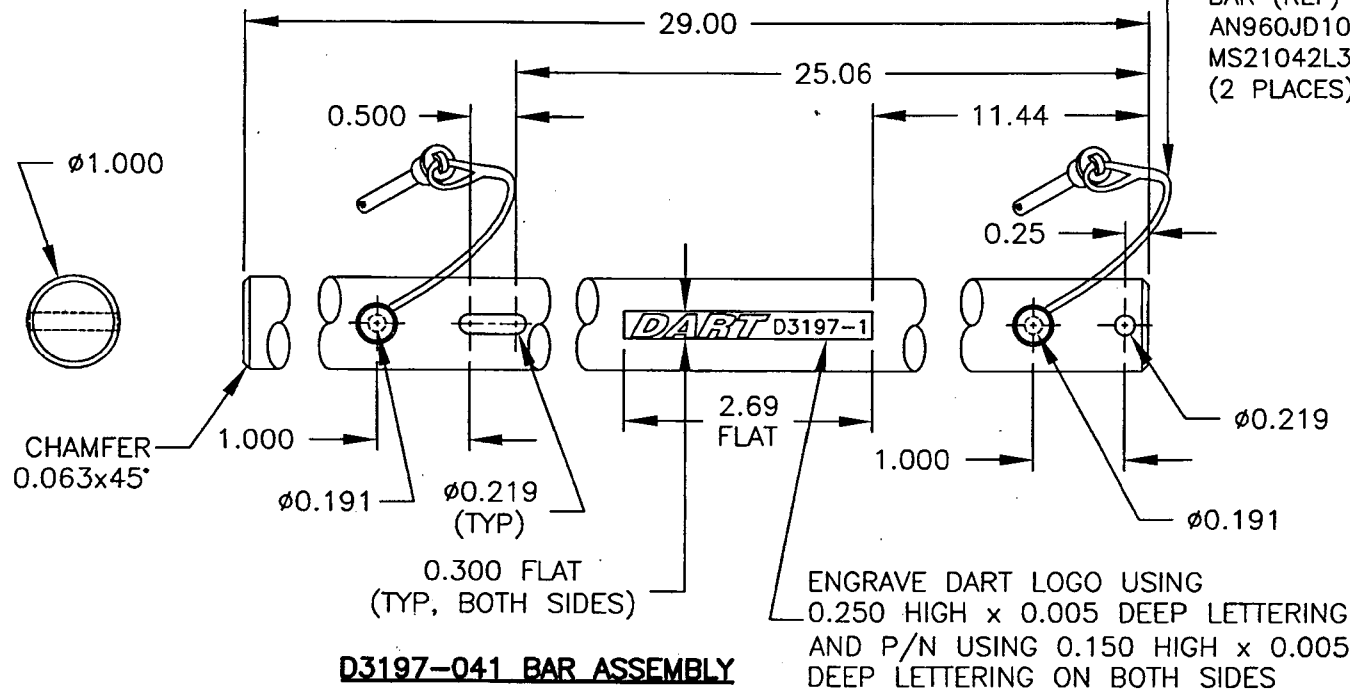
Measured by: <i>[Signature]</i>	Audited by: <i>[Signature]</i>	Prototype Approval:	N/A
Date: 04/04/28	Date: 07/04/29	Date:	N/A

Rev	Date	Change	Revised by	Approved
A	04.04.20	New Issue (P/O D3197-041)	KJ/JLM	
B	07.03.09	Dwg revision update	KJ/JLM <i>[Signature]</i>	<i>[Signature]</i>

**DART**

RELEASED

D3489-3-200 PIP PIN (1)  
D3242-1 TAG (1)  
MS27039-1-24 BOLT (1)  
AN960JD10 WASHER (1)  
D2690-5 LANYARD (1)  
AN960JD10 WASHER (1)  
BAR (REF)  
AN960JD10 WASHER (1)  
MS21042L3 NUT (1)  
(2 PLACES)



**D3197-041 BAR ASSEMBLY**

**D3197-1 BAR**

- 1) MATERIAL: 7075-T73 ROUND BAR (QQ-A-200/11 or QQ-A-225/9) Ø1.000 (REF DART SPEC. M7075T73R1.000)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
POWDER COAT SANDTEX (4.3.5.6) PER DART QSI 005 4.3
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- 4) ALL DIMENSIONS ARE IN INCHES
- 5) FOR TOOLING, IT IS ACCEPTABLE TO HAVE A 0.06 DEEP x 60° CENTER MARK AT EITHER END OF THE BAR

SHOP COPY  
RETURN TO  
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UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITH NOTICE  
WORK ORDER  
NO. 21674

x6

DESIGN	CP	DRAWN BY	CP	DART AEROSPACE LTD
CHECKED		APPROVED		HAWKESBURY, ONTARIO, CANADA
DATE	06.01.10	TITLE	D3197	REV. B
		BAR		SHEET 1 OF 1
		NEW ISSUE		SCALE
		CHG PIP PIN; ADD D3242-1 TAG		1:1

Wb 46741

4.1.3 D3196-1/-3/-4 Fastener Analysis

The D3196-1/-3/-4 brackets will be installed with MS24694-S154 screws.

$F_t := F_{fwd}$	$F_t = 1447 \cdot \text{lb}$	Maximum tensile load on MS24694-S154
$F_s := F_{fwd}$	$F_s = 1447 \cdot \text{lb}$	Maximum shear load on MS24694-S154
$F_{tmax} := 7250 \cdot \text{lb}$		Allowable tensile load on MS24694-S154
$F_{smax} := 9583 \cdot \text{lb}$		Allowable shear load on MS24694-S154
$MS := \frac{F_{tmax}}{F_t} - 1$	$MS = 4.01$	Margin of Safety
$MS := \frac{F_{smax}}{F_s} - 1$	$MS = 5.62$	Margin of Safety

4.1.4 D3196-1/-3/-4 Bearing Failure at Slots

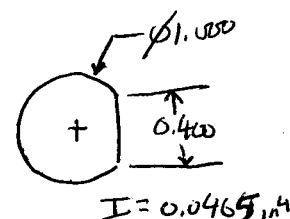
The most critical aspect of the attachment of the D3196-1/-3/-4 bars to the airframe is the bearing of the countersink MS24694 screw heads in the countersunk slots of these bars because there will be minimal contact area. To be conservative, the width of contact is assumed to be only 0.125". Also, the tensile ultimate and yield properties are used as the bearing ultimate and yield properties respectively.

$F := F_{fwd}$	$F = 1447 \cdot \text{lb}$	Maximum tensile load on MS24694-S154
$Ab := 2 \cdot 0.206 \cdot \text{in} \cdot 0.125 \cdot \text{in}$	$Ab = 0.0515 \cdot \text{in}^2$	Bearing Area (assuming only 0.125" contact)
$F_u := F_{bru1} \cdot Ab$	$F_u = 2678 \cdot \text{lb}$	Allowable Bearing Load (Ultimate)
$MS := \frac{F_u}{F} - 1$	$MS = 0.85$	Margin of Safety (Ultimate)

4.2 D3197-041 Bar Analysis4.2.1 D3197-041 Bar Bending Failure

The loading of the D3197-041 Bar is shown in Figure 3 of Appendix B. The worst case loading is the 16g forward acting load because the magnitude of the load is higher and the section is smaller in the fwd-aft direction (16g) than it is in the up-down direction (4g).

$od := 1.0 \cdot \text{in}$		OD of D3197-041 bar
$k := 1.7$		Shape Factor (Bruhn C3.3)
$M := 7917 \cdot \text{in} \cdot \text{lb}$	$M = 7917 \cdot \text{in} \cdot \text{lb}$	Maximum Ultimate Bending Moment
$I := \frac{\pi}{64} \cdot od^4$	$I = 0.04909 \cdot \text{in}^4$ 0.0465	Inertia of cross section
$F_{bu2} := F_{tu2} + F_{o2} \cdot (k - 1)$	$F_{bu2} = 109120 \cdot \text{psi}$	Modulus of Rupture (Bruhn C3.11)
$M_u := F_{bu2} \cdot \frac{2 \cdot I}{od}$	$M_u = 10712.83 \cdot \text{in} \cdot \text{lb}$ 10146	Allowable Bending Moment (Ultimate)
$MS := \frac{M_u}{M} - 1$	$MS = 0.35$ 0.28	Margin of Safety (Ultimate)



OK 09.04.29

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Revision: A

Date: 03.09.26